

Applicants: Joseph A. Fernando, *et al.*

Response to Office Action Dated: March 30, 2009

Response Filed: June 30, 2009

**II. REMARKS**

Claims 1, 2, 5-13, 16-27, 41-44 and 47-57 remain pending and under examination. Applicants respectfully request favorable reconsideration and allowance of the pending claims in view of the remarks provided herein.

Claims 1, 2, 5, 6, 8-13, 16, 17, 19-27, 47-50 and 52-57 have been rejected under 35 U.S.C. §103(a) as being as being unpatentable over Robinson et al. (United States Patent No. 5,580,532) in view of Myles et al. (United States Patent No. 4,240,833). Applicants respectfully traverse the rejection.

It is alleged that Robinson et al. disclose the claimed apparatus, except that Robinson et al. are silent as to the support element being made from ceramic fibers having the physical properties of fibers that are formed according to the claimed time-temperature heating regimen. However, it is also alleged that Myles et al. teach melt-formed and heat-treated microcrystalline ceramic fibers, and that it would have been obvious for one skilled in the art to substitute the fibers of Myles et al. for the fibers of the Robinson et al. apparatus. Applicants respectfully disagree.

To establish a *prima facie case* of obviousness under 35 U.S.C. §103(a) there must be (1) a suggestion or motivation to modify a reference, (2) a reasonable expectation of success, and (3) the modification of the reference must teach or suggest all claimed limitations. *In re Vaeck*, 947 F.2d 488 (Fed.Cir. 1991). Applicants respectfully submit that the reasons of record in the Office Action fail to establish all three elements of a *prima facie* case of obviousness under 35 U.S.C. §103(a). Because the Office Action fails to establish all elements of a *prima facie* case of obviousness under 35 U.S.C. §103(a), the rejection under 35 U.S.C. §103(a) should be withdrawn.

The Office Action identifies certain limitations of the claimed exhaust gas treatment device which are allegedly disclosed by Robinson et al., but expressly and

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unequivocally concedes that Robinson et al. *do not* disclose or suggest an exhaust gas treatment device mounting mat containing ceramic fibers having the percent crystallinity or crystallite size as claimed in the present application. Furthermore, Robinson et al. do not provide any suggestion or motivation to treat the ceramic fibers to provide such crystallinity and crystallite size.

Because the product of Robinson et al. does not disclose the claimed features of melt-formed ceramic fibers having that claimed percent crystallinity and crystalline size, the product of the instant claim is not substantially the same as the product of Robinson et al. Furthermore, the combination of Robinson et al. with Myles et al. does not arrive at the presently claimed invention, because this combination of references does not show all of the claimed limitations.

Evidence showing there was no reasonable expectation of success may support a conclusion of nonobviousness. In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976). Whether an art is predictable or whether the proposed modification or combination of the prior art has a reasonable expectation of success is determined at the time the invention was made. Ex parte Erlich, 3 USPQ2d 1011 (Bd. Pat. App. & Inter. 1986).

For the combination of Myles et al. and Robinson et al. to have been obvious at the time of the invention, a person of ordinary skill in the art would have needed some reason upon which to base an expectation of success. A reasonable expectation does not exist in this case. Myles et al. is directed to a refractory fiber for use as furnace insulation. A furnace is a static structure that is commonly used in a controlled environment. Myles et al. do not teach that the fiber disclosed is useful in any application other than furnaces, or that the fiber might be used in mechanically or thermally dynamic environments, such as in automotive exhaust gas treatment devices. Therefore, there is no reasonable basis upon which to base a prediction that use in such application would succeed.

Additionally, Myles et al. do not disclose that the fibers have the mechanical properties needed during normal operation in the environments described in Robinson et al., namely, catalytic converters and diesel particulate traps. The environments described in Robinson et al. are far more mechanically demanding environments than are furnaces, the Robinson et al. devices are commonly subject to mechanical impact, vibration, multi-axial loading, and fatigue that would be extremely unusual for furnaces. Accordingly, a person of ordinary skill in the art would not have reason to assume that the fibers of Myles et al. can withstand more demanding mechanical conditions than those for which they were designed or intended.

The dynamic forces to which the devices of Robinson et al. are subjected act intermittently and fluctuate, create many load cycles, and can theoretically induce high-cycle or even very high-cycle fatigue conditions. For example, engine vibrations from an engine averaging 3000 revolutions per minute at highway speeds of 60 miles per hour over 60,000 miles will induce 180 million (180,000,000) cycles in the vehicle catalytic converter. 180 million loading cycles is very high-cycle fatigue. Applicants contend that no furnace loading pattern could be anticipated to produce such very high-cycle fatigue. Again, one having ordinary skill in the art would have no reason to assume that furnaces or materials for use in furnaces will withstand very high-cycle fatigue loading of such magnitude.

The fibers described in Myles et al., for use in a furnace, would not need to withstand and could not be predicted to withstand the low temperature extremes, the rate of temperature change, or the frequency of temperature change of the devices described in Robinson et al. At the time of the invention, a person of ordinary skill in the art would have no basis upon which to predict that the fibers described in Myles et al. could successfully withstand the different thermal demands of the devices described in Robinson et al.

The Office Action further alleges that the presently claimed holding pressure would be inherent, claiming “that the heat treating regimen of Myles is the same as or obvious over Applicant’s own heating treatment regimen, a support element comprising the ceramic fibers of Myles would inherently exhibit the necessary holding pressure.” Applicants deny that the holding pressure of the currently claimed mounting mat is inherent in the Myles et al. teaching.

Page 8 of the Office Action alleges that Myles et al. show dramatically less shrinkage under high temperatures, and therefore it is alleged that this provides a stable pressure over a wide range of operating temperatures. Resistance to shrinkage is a different and independent property of the material than its ability of provide sufficient holding pressure. The holding pressure of the support element is a result of the heat treatment so that the element does not experience a permanent compression set. Nevertheless, and without acquiescing to the Examiner’s position, Applicants submit “that which is inherent in the prior art, if not known at the time of the invention, cannot form a proper basis for rejecting the claimed invention as obvious under §103.” See *In re Shetty*, 566 F.2d 81, 86, 195 U.S.P.Q. 753, 756-57 (C.C.P.A. 1977). Obviousness cannot be predicated on what is not known at the time an invention is made, even if the inherency of a certain feature is later established. *In re Rijckaert*, 9 F.2d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993). The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *Id.*; *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). Because neither of the references teaches or suggests a material that was known to provide the claimed holding pressure, the references do not provide all of the limitations of the claims and therefore do not establish a *prima facie* case of obviousness.

Furthermore, Robinson et al. do not disclose, suggest, or provide motivation to utilize melt-formed ceramic fibers to prepare a support element for an exhaust gas treatment device. Robinson et al. disclose that suitable fibers for use in preparing a mounting mat include polycrystalline ceramic oxide fibers prepared in accordance with

Applicants: Joseph A. Fernando, *et al.*

Response to Office Action Dated: March 30, 2009

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United States Patent No. 4,159,205 and United States Patent No. 4,277,269. These references only teach sol-gel processes preparing polycrystalline ceramic oxide fibers. The disclosed sol-gel processes involve fiberizing fibers from a solution of dissolve ceramic oxide precursor material.

In contrast to the sol-gel processes of Robinson et al. that involve fiberizing solutions of ceramic oxide precursor materials, the fibers utilized in the support element of the presently claimed exhaust gas treatment device are prepared by melt-forming processes. Melt-forming involves the melting of solid ceramic oxide precursor material to form a melt of ingredients and forming fibers by a technique, such as blowing, drawing, or spinning. In contrast to the sol-gel processes, the melt-forming processes do not involve dissolving ceramic oxide precursor materials in a solution and then fiberizing the solution. On the other hand, Myles et al. supply no teaching or suggestion whatsoever regarding the use of sol-gel fibers or that melt-formed fibers are a functional equivalent to sol-gel fibers.

Accordingly, Robinson et al. actually teach away from the present claims. The Supreme Court in *KSR*, in discussing *United States v. Adams*, 383 U.S. 39 (1966), stated: “when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be non-obvious.” *KSR International Co. v. Teleflex Inc.*, 550 U.S. \_\_, 82 USPQ2d 1385 (2007), (Slip. Op. at 12).

Post-*KSR* cases support the longstanding proposition that a prior art “teaching away” from the claimed invention will support a finding of non-obviousness. For instance, in *Takeda Chemical Industries, Ltd. v. Alphapharm Pty., Ltd.*, 492 F.3d 1350 (Fed. Cir. 2007), decided after *KSR*, the Federal Circuit rejected an “obvious to try” argument. Alphapharm argued that it was obvious to select “compound b” and modify it to arrive at the claimed invention. Takeda demonstrated that compound b was one of hundreds of millions of compounds disclosed in the art and that references taught away from its use.

Robinson et al. disclose characteristics of a mounting mat such as good handleability, the capability to withstand high temperatures without degradation while maintaining a stable pressure over a wide range of operating temperatures, flexibility, and the ability to maintain structural integrity. However, Robinson et al. do not supply the motivation to modify the apparatus of Robinson to substitute the ceramic fibers of Myles et al. Myles et al. is directed for furnaces in a static environment – Myles et al. *does not address holding forces*. Therefore, it is not predictable that a melt-formed blanket of Myles et al. would have the adequate holding force as described in Robinson et al. when Myles et al. does not even address holding force issues and the fiber of the Robinson et al. mat is of a different material (sol-gel fibers). Without any factual substantiation, the Office Action presumes that a sol-gel fiber based mounting mat (as described in Robinson et al.) is equivalent to a melt-formed fiber blanket for furnaces (as described in Myles et al.) even though neither reference discloses such a relationship.

Page 9 of the Office Action alleges that there would have been a reasonable expectation of success in employing the melt-spun and heat-treated ceramic fibers of Myles et al. in the support element of Robinson et al., “because the use of melt-spun and heat-treated ceramic fibers in dynamic, e.g., automotive, environments” was allegedly known in the art to be satisfactory based upon Langer (United States Patent No. 5,250,269). The Office Action also contends that the prior art to Langer [i.e., Johnson et al. (United Kingdom Patent No. 1,481,133)] further suggests that one of ordinary skill in the art would have considered ceramic fibers which were commonly used in furnace installation to be highly relevant in automotive applications. Applicants respectfully disagree. Langer discloses ceramic fibers of a fine-grained crystalline structure, or preferably, an amorphous structure. See Langer Abstract. Likewise, Johnson et al. disclose melt-formed refractory ceramic fibers that can be annealed to develop a fine-grained crystalline form, of less than 200Å, “while avoiding higher temperatures that would result in a course-grained structure ...” See Column 2, lines 51-55. Langer actually discloses annealing fibers below the devitrification temperature of the fiber. Annealing

Applicants: Joseph A. Fernando, *et al.*

Response to Office Action Dated: March 30, 2009

Response Filed: June 30, 2009

fibers below the devitrification temperature does not result in the presently claimed crystallite sizes. Unlike Langer and Johnson et al., Applicants are claiming melt-formed refractory ceramic fibers having a larger grain size. Accordingly, Langer's disclosed ceramic fibers do not suggest that the presently claimed material would be useful or highly relevant in automotive applications. Rather, Langer teaches melt-formed fibers that remain fine-grained (as in the UK Johnson et al. patent) or *substantially amorphous*. See Column 2, lines 56-58.

Applicants' previous response pointed out that there would have been no motivation to substitute the melt-formed ceramic fibers of Myles et al. for the ceramic fibers of the support element in the apparatus of Robinson et al., because Robinson et al. would be "limited to the use of sol-gel derived fibers", given the disclosed examples of suitable polycrystalline oxide refractory ceramic fibers formed by sol-gel processes, found in United States Patent Nos. 4,159,205 and 4,277,269. In reference to the Examiners comments on page 9-10 of the Office Action, Applicants understand that disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or non-preferred embodiments. However, Robinson et al. fails to teach, suggest or provide motivation to utilize any fibers other than fibers prepared by sol-gel processes. Robinson et al. provide no other embodiments or working examples of other useful fibers.

The Office Action further alleges at page 10 that "the primary reference to Robinson discloses that the support element further comprises a sacrificial binder." Applicants assert that to the extent Myles et al. and Robinson et al. are combinable, there would nevertheless be no motivation to add an exogenous binder to the Myles et al. fiber. This is because Myles et al. teach a fiber that is sufficiently flexible without the addition of a binder.

For the aforementioned reasons, there can have been no reasonable expectation of success in combining Myles et al. and Robinson et al. at the time the invention was made

Applicants: Joseph A. Fernando, *et al.*

Response to Office Action Dated: March 30, 2009

Response Filed: June 30, 2009

such that the combination of Myles et al. and Robinson et al. cannot properly support an obviousness rejection. Applicants respectfully request that the obviousness rejection be withdrawn.

Claims 7, 18, 41-44 and 51 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Robinson et al. in view of Myles et al., and in further view of Sasaki et al. (JP 07-286514). Applicants respectfully traverse the rejection.

Sasaki et al. disclose a “holder” for exhaust gas purifying devices. The holder is comprised of alumina fibers. The composition of the alumina fibers of Sasaki et al. is strictly limited to fiber compositions having a weight ratio of  $\text{Al}_2\text{O}_3:\text{SiO}_2$  of 70:30 – 74:26. See Abstract (Pages 1 and 2); Claim 1; and Page 4, Lines 3-7. In fact, Sasaki et al. expressly teach that when the  $\text{Al}_2\text{O}_3:\text{SiO}_2$  ratio is not in the range of 70:30 – 74:26, fiber deterioration occurs prematurely and the fibers do not withstand long usage. See Page 4, Lines 4-7.

Evidence showing there is no reasonable expectation of success may support a conclusion of nonobviousness. *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976). The combination of Myles et al. and Sasaki et al. would not suggest to one of ordinary skill in the art a reasonable expectation of success. Sasaki et al. and Myles et al. clearly teach away from one another. Sasaki et al. teach that the fiber must be a mullite composition having a weight ratio of alumina to silica of “70/30 ~ 74/26”. See Sasaki et al., paragraph 5. Sasaki et al. also teach that when the alumina to silica ratio is not in the above-described range, fiber deterioration caused by crystallization and crystal growth at high temperatures occurs prematurely and it does not withstand long usage. See Sasaki et al., paragraph 5. Myles et al. teach the fibers are manufactured from a melt containing about 40 to about 65 weight percent alumina and from about 35 to about 60 weight percent silica. See Myles et al., column 2, lines 36-40. Since the range of weight percent of alumina taught by Sasaki et al. is 70 to 74, and since the range of weight percent of alumina taught by Myles et al. is 40 to 65, the respective ranges of alumina are mutually exclusive. Since the range of weight percent of silica taught by Sasaki et al. is 26 to 30, and since the range of

Applicants: Joseph A. Fernando, *et al.*

Response to Office Action Dated: March 30, 2009

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weight percent of silica taught by Myles et al. is 35 to 60, the respective ranges of silica are mutually exclusive. Thus, no proper obviousness rejection can be made based upon a combination which includes a combination of Sasaki et al. and Myles et al.

In determining the differences between the prior art and the claims, the question under 35 U.S.C. §103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratosflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); *Schenck v. Nortron Corp.*, 713 F.2d 782, 218 USPQ 698 (Fed. Cir. 1983) (claims were directed to a vibratory testing machine (a hard-bearing wheel balancer) comprising a holding structure, a base structure, and a supporting means which form "a single integral and gaplessly continuous piece." *Nortron* argued the invention is just making integral what had been made in four bolted pieces, improperly limiting the focus to a structural difference from the prior art and failing to consider the invention as a whole. The prior art perceived a need for mechanisms to dampen resonance, whereas the inventor eliminated the need for dampening via the one-piece gapless support structure. "Because that insight was contrary to the understandings and expectations of the art, the structure effectuating it would not have been obvious to those skilled in the art." 713 F.2d at 785, 218 USPQ at 700 (citations omitted).).

It is impermissible within the framework of 35 U.S.C. §103 to pick and choose from any single reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. *Lubrizol Corp. v. Exxon Corp.*, 896 F. Supp. 302, 322, 7 USPQ2d 1513, 1527 (N.D. Ohio 1988) (It is not permissible to pick and choose only so much of any given reference as will support a given position and ignore the reference in its totality."). In *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc.*, the Federal Circuit held that a single line in a prior art reference should not be taken out of context and relied upon with the benefit of hindsight to show obviousness. 796 F.2d 443, 230 USPQ 416 (Fed. Cir. 1986), *cert. denied*, 484 U.S. 823 (1987). Rather, a

Applicants: Joseph A. Fernando, *et al.*

Response to Office Action Dated: March 30, 2009

Response Filed: June 30, 2009

reference should be considered as a whole, and portions arguing against or teaching away from the claimed invention must be considered.

*As a whole*, Myles et al. and Sasaki et al. teach away from each other. In the course of formulating differences between the prior art and the claims, one cannot utilize individual teachings from a reference, while ignoring others. The claimed invention as a whole must be considered. The fiber compositional ranges disclosed by Myles et al. and Sasaki et al. are mutually exclusive and teach away from each other. These divergent teachings cannot be ignored and preclude the combination of Myles et al. and Sasaki et al. Because Sasaki et al. and Myles et al. teach away from one another, it is improper to combine Myles et al., Sasaki et al. and Robinson et al. Thus, it is not relevant whether or not the fibers contain shot (claims 7, 18, 51) or whether or not the support element or mat is needed (claims 41-44).

In view of the above remarks, Applicants respectfully request withdrawal of all pending rejections, and further request the issuance of a formal notice of allowance directed to claims 1, 2, 5-13, 16-27, 41-44, and 47-57. Should the Examiner have any questions regarding the remarks presented in the present response, Applicants' undersigned attorneys would welcome a telephone call.

Respectfully submitted,

  
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